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# THE OPTIMAL LENDING RATE OF BANK PERKREDITAN RAKYAT(BPR)

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# THE OPTIMAL LENDING RATE OF *BANK PERKREDITAN RAKYAT* (BPR)

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## Abstraksi

*Paper ini bertujuan untuk menganalisa tingkat suku bunga kredit Bank Perkreditan Rakyat (BPR), sesuatu yang menjadi perdebatan di lingkungan institusi di Indonesia, sebagai dampak proses liberalisasi keuangan yang memungkinkan bank untuk menetapkan suku bunga yang tinggi. Paper ini mempergunakan model mikro untuk mengelaborasi peran aktif bank, khususnya yang berskala kecil seperti BPR.*

*Setelah tingkat suku bunga kredit diperoleh, dilakukan beberapa simulasi untuk melihat formasi tingkat suku bunga pinjaman optimal, dan cara terbaik menurunkan resiko dan besaran suku bunga tersebut. Data yang dipergunakan memiliki dua level agregasi yang berbeda, pertama, menempatkan bank BPR sebagai unit observasi dan kedua, penggabungan bank menurut region sebagai unit sampelnya.*

*Hasil dari paper ini diharapkan dapat memperkaya pemahaman atas keuangan mikro di Indonesia dan kaitannya yang erat dengan manajemen moneter*

**JEL**: D81, E43, E58, G21

*Keyword:* lending rate, financial liberalization, micro model, risk, BPR

## I. INTRODUCTION

### I.1 Background

In the macro model of financial systems, neither the Keynesian Growth model, Endogenous Growth model nor the McKinnon and Shaw model pays attention on the banking and the financial markets, because banking is seen as a passive aggregate through an indirect approach. On the other hand, in a micro model such as the financial institutions, instruments and the markets analysis, the banking is seen to have an active institutional role.[1] In addition, it is believed that the transaction costs are the key to the economic performance.[2] However, the assumption of the Neo-classic theories about zero transaction cost will not be hold as the institutions are important and transaction costs are positive.[3]

For the future economic development, Indonesia needs an institutional infrastructure.[4] The current research uses a micro model to elaborate the active role of banking, especially the small banking such as Bank Perkreditan Rakyat (people's credit banks, henceforth referred to as BPR). BPR is considered as bank, even though it is designed as secondary bank position with its special function to serve the small and medium enterprise.

This micro result can be used as an input for the macro monetary management. The need for a more integrated approach between the micro and macro approach emerged only after the mid-nineties due to a better understanding of the close link between the soundness of banking systems and monetary management.[5] A holistic approach has also emerged with regard to economic development.

The small commercial BPR with limited activity and preserved variegated ownership has growing, from 1,343 units in 1996 to 1,419 in 2000. Regardless of its role to boost the regional economic development, the BPR is criticized for its high interest rates. Jusuf Kalla, the former coordinating minister of social affairs, BPR should reduce its high interest rate[6]. MUI (Indonesian Council of Ulemas) banned the usury practice of any banks, especially the

1 Fry: Money, Interest and Banking in Economic Development, 1995, page 293

2 Douglass North in Fry (1995, 293)

3 Ronald Coase in Fry (1995, 293)

4 Stigliz in Sudradjat Djiwandono, Some notes on post crisis development of Indonesia A paper presented at the conference "Two Years of Asian Economic Crisis: What Next?" organized by the Woodrow Wilson Center Asia Program, Washington DC, September 22, 1999.

5 Sudradjat Djiwandono explained that in 1991 the IMF published "Banking Crisis: Cases and Issues", edited by V.Sundararajan and Thomas Balino. In 1996 and 1997 other studies were published, for example: Bank Soundness and Macroeconomic Policy, edited by Carl Johan Lindgren et al. (IMF), Bank Restructuring: Lessons from the 1980's edited by Andrew Sheng (WB), Systemic Bank Restructuring and Macroeconomic Policy edited by William E. Alexander et al., and Banking Soundness and Monetary Policy, edited by Charles Enoh and John Green (IMF).

6 This high lending rate of BPR startled Yusuf Kalla, the Indonesian Coordinating Minister of Peoples' Welfare during the First Regional Workshop or Rakerda I DPD Perbarindo DKI Jaya and its boundaries in Serang Banten July 2003, because he found the lending rate was 48% per year.

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high interest rate of BPR. This study will focus on the optimal lending rate of commercial BPR given the exit policy, and assume the monopolistic market structure to reveal the mechanism of BPR's interest rate.

### I.2 Study Purpose

This study focuses on finding the BPR optimal lending rate based on the monopolistic model assumption where the BPR maximize its profit. As a monopolist, each individual BPR will have its own optimal rates. The simulation will be carried out to find the risk free rate and the risk premium in order to reduce the lending rate. Based on this result, we will make some policy recommendation, regarding the irrefutable decision of BI to let the inefficient bank get out of business, including the BPR, due to the spirit of the financial liberalization.

### I.3 Hypothesis

1. A negatively sloped and inelastic demand curve enables BPR to maximize profit as the price maker; it is based on assumptions of monopolistic competition.
2. Different BPR interest rates exist both individually, due to the existence of different individual BPR liquidity, lending and customer profile risk and fund costs.

## II. THE MODEL

The model for BPR profit maximizing was developed by combining two parts: *first*, the Monti Klein Model with liquidity risk[7] (See Prisman, Slovin and Sushka), and *second*, the Raj Model[8] (by inserting credit risk). The latter model is based on the lender risk hypothesis found in informal moneylenders.

BPR profit is equal to total revenue minus total cost or $\prod$= TR-TC. The reduced form of the optimal deposit and lending rate, indicated by MR=MC, is as follows:

$$r^*_D = \frac{r^*_{PEN}\,\Pr[\bar{x} \geq R]}{(1-\frac{1}{\varepsilon_D})} \qquad \text{(IV.1)}$$

$$r^*_L = \frac{r_{WACF+1+r_{PEN}}\Pr[\bar{x} \geq R]}{\Pr[\bar{y} \leq L](1-\frac{1}{\varepsilon_L})} - \frac{1}{(1-\frac{1}{\varepsilon_L})} \qquad \text{(IV.2)}$$

$r_L$*is the optimal lending rate, $r_{WACF}$ is the weighted average cost of fund, $r^*_D$ is the optimal time

7 Freixas, Micro Economic of Banking, 229-231.

8 Raj, Debraj, 1998. Theories of informal Credit Markets. In Development Economics, Princeton University Press, New Jersey :544, 579.

deposit rate, $\mathbf{r}^*_S$ is the optimal saving rate, $r^*_{IBL}$ is the optimal inter-bank rate and $\mathbf{r}^*_{NBL}$ is the optimal non bank rate, which is implicit within the $\boldsymbol{r}_{WACF}$. The penalty rate from liquidity shortage is $\boldsymbol{r}_{PEN}$, $\Pr[\bar{x} \geq R]$ is the probability of the amount of lending that exceeds the reserve requirement R, and $\Pr[\bar{y} \leq L]$ is the probability of credit to not default, while $\frac{1}{\varepsilon_L}$ is the Lerner monopoly power, and $\varepsilon_L$ and $\varepsilon_D$ are correspondingly the elasticity demand for credit and elasticity supply of deposit ( the detail of this model can be seen in the appendix)

Now we will proceed by elaborating the following results such as seen below.

1. If the weight of the bank penalty for the soundness rate for liquidity or $\boldsymbol{r}_{PEN}$ increases as well as liquidity risk $\Pr[\bar{x} \geq R]$, the credit rate $\mathbf{r}_L^*$ and deposit rate $\mathbf{r}_D^*$ also increase. Consequently the volume of credit L decreases and the volume of deposit D increases.
2. If the probability of credit default or NPL increases, the probability of credit success or $\Pr[\bar{y} \leq L]$ decreases, then the rates $\mathbf{r}_L^*$ will increase.

## II.1 Data

This research uses two different levels of aggregation. *First*, the BPR individual bank sample in Jabotabek, covering 41 of 349 BPR in this area; *second*, the aggregate BPR data, covering all the 2.228 BPR in Indonesia. The aggregated data are categorized in 43 regional office of BI.

We utilize the information provided in income statement and the balance sheet of the BPR to asses their performance and Sakernas data to proxy the customer profile including their aggregate demand. To see regional uniqueness, the RGDP, regional expensiveness index, consumption pattern and poverty data were obtained from the National Bureau of Statistics (BPS) and further calculated by LPEM-FEUI. Exclusion is made for the crisis years of 1997 and 1998 to avoid structural breaks that disturb the proper calculation of the optimal lending rate. The annual data is used from 1996-2002 in Jabotabek and from 1994-2002 in KBI (Regional Office of Bank Indonesia).

## II.2 Rule of Thumb Calculation for BPR Lending Rate

According to Perbarindo calculation[9], the interest rate formation in BPR consists of four elements: (1) the cost of fund or COF; (2) overhead cost or OHC; (3) risk premium or RISK and (4) profit margin or PROFIT. The rule of thumb formula (based on accounting principle) for BPR lending rate is as follows:

$$COF + OHC + RISK + PROFIT = 100\% \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (IV.5.1a)$$

9 Interview with pak Dean from Perbarindo

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BPR Lending rate= (100%)/(cost of fund share)*SEROWCL …. (IV.5.1b)

In this case, SEROWCL is the lending rate from government owned bank (BANK PERSERO) for working capital. The inclusion of SEROWCL is due to the fact that a lot of BPR got their funding from other general banks with the lowest possible commercial rate. The share of cost of fund is taken by summing up the four elements of BPR lending rate, which is equal to 100%. This rule of thumb calculation is used as the benchmark rate of the further econometric exercise.

## III. RESULT AND ANALYSIS

In this dissertation, limited information approaches are used starting with the OLS, and continuing with the 2SLS using recursive model[10].

### III.1 The best model

#### III.1.1 The best model in Jabotabek:

The best model can be selected based on several considerations: (1) the magnitude of the weighted average cost of fund rate; (2) the magnitude of the optimal lending rate; and (3) the elasticity demand of credit.

In the 2SLS-JBTB and 2SLS1-JBTB models, the dummy place is put in the instrumental variables[11]. The instrumental variables in the 2SLS models are the place where BPR are located such as Bogor, Bekasi, Karawang, Cilegon and Tangerang. This dummy place is included in instrumental variable as they are regionally specific but are not related either to the BPR performance or error. Other variables included in instrumental variables namely food expenditure (*makan*), RGDP per capita (*pkapko*), party expenditure in the district (*pesta*), regional expensiveness index (IKK), growth deflator (*grdef*), the intercept (c), deflator (*def*), urban poverty (*mikot*), rural poverty (*mides*), the number of people working as trader in rural area (*dagangd*) and the number of laborer working in service industry (*pegawai*), total number of workers (*totkerja*), the ratio number of the worker on leave (*libur*), the small entrepreneur with worker (*usahawan*) and the number of population in the district (*pddk*). The last two variables are calculated from Sakernas (National Survey for Worker) data to help us proxy and reveal the customer's profile of BPR.

10 The system is also developed by using SUR to find the optimal lending rate of individual BPR in Jabotabek as well as the aggregate BPR in KBI. But these models are not considered as the best model for these areas

11 Unlike the OLS-JBTB and SUR-JBTB models in which the elements of the dummy place are omitted due to the lower level of significance and also lowering the degree of freedom,

**Table IV.1. The Optimal All Deposit Rate In Jabotabek Using 2SLS Models**

| Optimal All Deposit Rate | | 2SLS-JBTB | 2SLS-JBTB1 |
|---|---|---|---|
| Intercept | coeff | 0.017 | 0.017 |
| | t-stat | 18.12** | 18.12** |
| Ln | coeff | 0.017 | 0.017 |
| (alldeposit) | t-stat | 18.12** | 18.12** |
| Proriskliqui | coeff | 0.017 | 0.017 |
| | t-stat | 18.12* | 18.12* |
| Sbridp/sbtab | coeff | -0.024 | -0.024 |
| | t-stat | -4.97** | -4.97** |
| Libur | coeff | -0.45 | -0.45 |
| | t-stat | -6.26** | -6.26** |
| Pegawai | coeff | -1.43E-07 | -1.43E-07 |
| | t-stat | -2.90** | -2.90** |
| **Optimal All Deposit Rate** | | **2SLS-JBTB** | **2SLS-JBTB1** |
| R-squared | | 0.40 | 0.40 |
| Det.residual covariance | | 4.49E-05 | 4.49E-05 |
| Optimal wacf rate | | 13.62% | 13.62% |
| Actual wacf rate | | 13.83% | 13.83% |
| Gap actual to optimal rate | | 0.21% | 0.21% |
| Elasticity supply of loanable fund (wacf) | | 7.79 | 7.79 |
| Elasticity supply of deposit | | 0.257 | 0.257 |
| Observation | | 254 | 254 |

Notes: ** means that the significance is below 5%; * is below 10%; while no star means below 15%

The findings are seen in table IV.1 and IV.2 in which both models create lower optimal lending rates as shown in table IV.1. Consecutively, the optimal lending rates (*sbkre*) in 2SLS-JBTB and 2SLS-JBTB1 models shown in table IV.2 are found as high as 41.89% and 38.34% compared to the actual lending rate, which is 38.81%.

The coefficients in *ln (alldeposit)* are positive because we anticipate the positive elasticity supply of all deposit. In all two models, the calculated optimal alldeposit (*wacf*) rates are 13.62% ; this is not far from the actual *wacf* rate, which is 13.83% in which both of the 2SLS-JBTB and 2SLS1-JBTB models give the small deviation form the actual *wacf* rate. In the optimal deposit rate (*wacf*) equation, the positive parameters are the intercept, the liquidity risk (*proriskliqui)*. The existence-lending rate of BRI as the competitor compare to the saving rate of BPR (*sbritb/sbtab*) is seen as the negative sign shown in table IV.2 in 2SLS-JBTB model. The R-squared in these models are 0.40 (as seen in table IV.1) for optimal wacf rate and 0.16 and 0.60 for optimal lending rate (table IV.2) and the determinant residual covariance is all small 4.49E-05 and 2.39E-05 in 2SLS-JBTB and 2SLS-JBTB1 models respectively, which indicates these two models are good.

From the magnitude of the optimal lending rate, shown in table IV.2, the 2SLS-JBTB1 model has small deviation of optimal lending rate compared to the actual lending rate, or

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**Table IV.2. The Optimal Lending Rate In Jabotabek Using 2SLS Models**

| Optimal Lending rate | | 2SLS-JBTB | 2SLS-JBTB1 |
|---|---|---|---|
| **Intercept** | coeff | 0.3186 | 0.280 |
| | t-stat | 3.73** | 3.25** |
| Ln (Tkred/ totas) | coeff | -0.2012 | -0.15 |
| | t-stat | -2.49** | -2.67** |
| npl | coeff | 0.3258 | 0.280 |
| | t-stat | 4.034** | 3.25** |
| Wacf | coeff | 1.204 | 1.022 |
| | t-stat | 2.72** | 3.53** |
| Makan/pesta | coeff | 0.004 | 0.00035 |
| | t-stat | 1.93** | 2.24** |
| Sbrikr/sbtab | coeff | -0.035 | |
| | t-stat | -2.22** | |
| Pdkokap/ikk | coeff | -3.119 | |
| | t-stat | -1.801** | |
| Intervene | coeff | | -0.3068 |
| | t-stat | | -2.26** |
| **Optimal Lending rate** | | **2SLS-JBTB** | **2SLS-JBTB1** |
| **R-squared** | | 0.1654 | 0.60 |
| Optimal lending rate | | 41.89% | 38.34% |
| Actual lending rate | | 38.81% | 38.81% |
| Gap optimal-actual rate | | -3.08% | 0.47% |
| Elasticity demand for credit | | -1.748 | -2.523 |

Notes: ** means that the significance is below 5%; * is below 10%; while no star means below 15%

38.34% compare to 38.81%. From the T-statistic appearance from each variable, we have the best overall picture in 2SLS-JBTB1 compared to the other models, in which all of variables have T-stat significance below 5% level, except for the intercept and *sbrikr* (BRI lending rate) variables, which are below 10% level of significance. From the elasticity demand of credit, only these two models create relatively the inelastic demand curve -1.748 and –2.523 compare to the case of the Philippine's farmer demand[12] . These relatively inelastic nature of debtor's demand in 2SLS models confirm the assumption of monopolistic competition.

### III.1.2 The Best Model in KBI

When KBI aggregate data are runned, the OLS-KBI, and OLS-KBI1 is selected as the good models. Because the smallest gap in *wacf* rate and the inelastic nature of the demand for credits is found in the OLS-KBI1 model, hence, it is considered as the best model.

In OLS-KBI1 model, we are able to see the overall factors, including the monetary intervention and linkage program. The OLS-KBI model is used as the benchmark for the

12 Based on the study of Briones Roehlo (2000)

**Table IV.3. The Optimal All Deposit *(Wacf)* Rate In KBI Using OLS Approaches[13]**

| Optimal alldeposit (wacf) rate | | OLS-KBI | OLS-KBI1 |
|---|---|---|---|
| Intercept | coeff | 0.1881 | 0.1881 |
| | t-stat | 5.559** | 5.559** |
| Ln(alldeposit1) | coeff | 0.0057 | 0.0057 |
| | t-stat | 5.50** | 5.50** |
| Ikk | coeff | 0.00026 | 0.00026 |
| | t-stat | 3.086** | 3.086** |
| Rliquid | coeff | 0.0057 | 0.0057 |
| | t-stat | 5.50** | 5.50** |
| Usaha2d | coeff | 3.38E-08 | 3.38E-08 |
| | t-stat | 1.715* | 1.715* |
| Upahk/pdkokap | coeff | -0.021 | -0.021 |
| | t-stat | -2.64 | -2.64 |
| **Optimal alldeposit (wacf) rate** | | **OLS-KBI** | **OLS-KBI1** |
| R-squared | | 0.14 | 0.14 |
| Optimal Alldeposit rate | | 13.81% | 13.81% |
| Actual alldeposit rate | | 14.19% | 14.19% |

Notes: ** means that the significance is below 5%; * is below 10%; while no star means below 15%

OLS-KBI1 model, if we want to see the effect of removing the linkage variable. The detail elaboration is as follow based on table IV.3 and IV.4.

From the magnitude of the optimal *wacf* rate, these two models have similar results, all of which create higher optimal wacf rate compared to the actual data, as shown in table IV.3. Consecutively, the optimal lending rates (*sbkre*) in OLS-KBI, and OLS-KBI1 models shown in table IV.4 are found as high as 13.81% and 13.81% compared to the actual alldeposit rate, which is 14.19% for both models. From the existence of OLS-KBI model compare to OLS-KBI1 model shown in table IV.4, we are able to see that when the linkage variable is added from the equation, it creates reduction to the lending rate due to the negative parameter of linkage in the equation.

13 Both models have the similar equations for optimal wacf rate, but different for optimal lending rate

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**Table IV.4. The Optimal Lending Rate In KBI Using OLS Models**

| Optimal Lending Rate | | OLS-KBI | OLS-KBI1 |
|---|---|---|---|
| **Intercept** | Coeff | 0.173 | 0.1881 |
| | t-stat | 5.158** | 5.559** |
| Kredit/toaspr | Coeff | -0.028 | -0.024 |
| | t-stat | -4.95* | -2.19** |
| kredit | Coeff | 8.45E-10 | 8.19E-10 |
| | t-stat | 5.119** | 5.011** |
| Intervene*kredit | Coeff | -1.67E-09 | -1.642E-09 |
| | t-stat | -4.638** | -4.627** |
| linkage | Coeff | | -0.028 |
| | t-stat | | -2.19** |
| wacff | Coeff | 0.173 | 0.1881 |
| | t-stat | 5.158** | 5.559** |
| nplgrs | Coeff | 0.1535 | 0.149 |
| | t-stat | 1.767** | 1.74* |
| sbrikr/sbprdp | Coeff | 0.0228 | 0.0221 |
| | t-stat | 4.95** | 4.85** |
| otrckr/otrctb | Coeff | -8e-05 | |
| | t-stat | -1.70* | |
| Miskin/pdk | Coeff | 4.57e-05 | 4.5E-05 |
| | t-stat | 1.84** | 1.84* |
| **Optimal Lending Rate** | | **OLS-KBI** | **OLS-KBI1** |
| R-squared | | 0.24 | 0.27 |
| Elasticity demand of credit | | -3.93 | -0.5894 |
| **Optimal lending rate** | | 30.67% | 26.87% |

Notes: ** means that the significance is below 5%; * is below 10%; while no star means below 15%

## III.2 Determinants of Lending Rate:

The average optimal lending rate of BPR in Jabotabek is 38.34% up to 41.89%, and in KBI between 26.87% and up to 30.67%. In KBI, when BRI is raising the credit rate, BPR will follow (as seen in table IV. 4). In Jabotabek, the influence of BRI credit rate is in the opposite ( as seen in table IV.1 and IV.2).

The BPR lending rate is higher than BRI-UD, but Grameen Bank's interest rate in Bangladesh is lower that both of these banks with the magnitude of 20% (or 12% in real)[14] due to the existence of subsidy. Even though the KBI aggregate data is used to calculate the optimal lending rate, but it does not represents the individual bank behaviors. Unlike the inelastic informal credit demand in Philippine's peasant which is –5.79; in Jabotabek, the average credit demand of BPR is relatively more inelastic with the magnitude of -1.748, and

14 Ray, Debraj (1998), Theories of Informal Credit Markets. In Development Economics, New Jersey: Princeton University Press, page 544, 579.

the Lerner monopoly index[15] is equal to 0.572. In KBI assessment, credit demand elasticity in BPR is -0.589 with monopoly index equal to 1.69. This strengthens the monopolistic competition and loyalty of the BPR debtors for those located in the big cities. From 100% BPR's interest rate, the total risk components from *rule of thumb* calculation that use accounting principle is 33,70%, but from econometric assessment[16] the risk components are around 11.28% to 25.08% in Jabotabek and 9.21% up to 27.41% in KBI. These discrepancies are due to errors in econometric exercises. The missing variables that make the risk components appear smaller.

It is seen that small and economically weak group in poor areas have to pay higher interest rate because BPR sees them as the riskier customers. The proponents of the old paradigm[17] often use this finding to criticize BPR for being merciless to the poor people. Undeniably for the sake of business sustainability, to resist the peril of bankruptcy, there is no other choice except for maximizing its profit.

### III.2.1 in Jabotabek

The most important distinction between 2SLS-JBTB and 2SLS-JBTB1 is the inclusion of variable intervene (BI liquidity program) and the exclusion of non-significant variable sbrikr/sbtab in 2SLS-JBTB1 model. This higher predicted rate 41.89% in 2SLS-JBTB compares to the actual rate 38.81% does not mean that the missing variable (with positive direction of parameters) problem is absent or decreasing. It is due to the opposite direction of bias. The lower predicted lending rate 38.34% in 2SLS-JBTB1 compares to the actual rate 38.81% means that the missing variables exist. When we compare the elasticity demand of credit using 2SLS approach, the relatively most inelastic demand -1.748 is found in 2SLS-JBTB model and the second one –2.523 is found in 2SLS-JBTB1 model. It seems that when BI creates liquidity program to BPR, the *intervene* variable, not only the interest rate of BPR is lower, but also the more elastic demand of credit is emerged.

In 2SLS model, the gap between calculated optimal lending rate 41.89% and the actual lending rate 38.81% is 3.05%. In 2SLS-JBTB1 model the gap is only 0.47% , which makes the 2SLS-JBTB1 model the best model in terms of lending rate. In this model, the intercept parameter of optimal lending rate is 0.28, and the total amount of credit in natural logarithm ln(*tkred/totas*) in the district[18] creates negative parameter. The elasticity demand of credit

15 Econometrically this fact exist if conjectural variations _ (the reaction function of the firm as those developed by Cournot oligopolistic model) is equal one, hence from the equation (P-MC)/P= (_+ (1-_) H)/_ the equation (P-MC)/P=1/_. will be found. In this case H is the Herfindahl index for the market concentration.

16 In which consecutively 8.23 %, 0.01% and 2.87% came from the credit risk, liquidity risk and consumer profile risk.

17 As those elaborated by Padmanabhan

18 In E views software, the log expression means Ln (natural logarithmic)

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equals to -2.523. In 2SLS-JBTB1 the elasticity demand of credit is -1.748. This number is also more inelastic compare to the Philippine rice farmer demand for informal lending, which is -5.79[19]. This elasticity demand of credit is on par with our assumption about the monopolistic nature of BPR customers. Monopolistic competition is situated between perfect monopoly and perfect competition in which the negatively sloped demand curve exists. The slope is not exactly equal to zero such as in perfectly inelastic demand or equal to ~ (infinity) such as in perfect competition. Hence, the 2SLS1-JBTB model is the best model in Jabotabek in terms of representing the most inelastic demand of credit -1.748 that reflecting the more loyal customer compare to the other models. The R-squared in 2SLS-JBTB1 model also good as high as 0.60.

In optimal lending rate equation of 2SLS-JBTB1 model as seen in table IV.4, the magnitudes of credit risk (*npl*) parameter as well as the weighted average cost of fund (wacf) rates are consecutively 0.280 and 1.022, which means that the higher the credit risk (*npl*) and the weighted average cost of fund (*wacf*), the higher the optimal lending rate. The interesting thing is the existence of the ratio of BRI lending to BPR saving rate (*sbrikr/sbtab*) in 2SLS-JBTB, which creates negative parameter in BPR lending rate, with significant level is below 5%. It means that BRI becomes the strategic substitute of BPR[20]. Every time BRI increases the lending rate compared to the BPR saving rate, BPR will reduce the lending rate. But in 2SLS-JBTB1 model, when variable BI liquidity program *intervene* is put inside the equation, this BRI lending rate variable is not significant; hence it is omitted.

The customers' profiles safety (as the opposite of risk) are also reflected in the 2SLS-JBTB and 2SLS-JBTB1 model, which is captured through the worker on leave in the district or the (*libur*) variable and the workers working at the service sector (*pegawai*), which has negative sign and significance below 5%. The richer the area as reflected from the per capita RGDP divided by consumer's price index (*pdkokap/ikk*) the less the lending rate in 2SLS-JBTB model. It means that the more the economically weak group working in service sector, or able to take a leave, or working in richer area, the lower the lending rate of BPR. The optimal lending rate of BPR in 2SLS-JBTB and 2SLS-JBTB1 models is 38.34%, which is not far from the actual BPR rate, 38.81%. This lower predicted rate compare to the actual data is due to missing positive variables.

19 this is calculated by R. Briones (2002)

20 As those elaborated by Stephen Martin

### III.2.2 in KBI:

The optimal lending rates (*sbkre*) in the OLS-KBI and OLS-KBI1 models shown in table IV.4 are 30.67% and 26.96% respectively compared to the actual lending rate, which is 31.12%. Hence, the missing variables create positive gaps in these two models.

On the other hand, the T-statistics from the OLS-KBI model are significant which give the good overall picture of this model, in which the majority of parameters have T-statistic below 5% significance level, except the parameter of *usaha2d* or the small entrepreneur in rural area, the *nplgrs* or non performing loan, and *miskin/pdk* or the ratio of people under poverty line compare to total population in the district which are below 10% significance level.

In this case we have negative parameter of total credit per total asset of BPR or *kredit/toaspr*, which represents the negative elasticity demand of credit. The reason why we divide total credit by total asset is to see the portfolio of BPR asset and to proxy the risk-related weights for the computation of the capital to asset ratio[21]. The main idea is that if banks behave as portfolio managers when they choose the composition of their portfolio of assets and liabilities, this risk-related weight is very important to be considered[22]. The larger the ratio of credit compares to total asset in KBI, the smaller the lending rate because BPR able to create bigger economic of scale and the elasticity demand of credit is negative. In this case, because asset is the denumerator and based on the law of large number, the bigger the BPR asset, the better for BPR to create portfolio of risk when performing their intermediary function. Hence, the interest rate is also reduced. Other variable that is able to reduce the lending rate as seen in table IV.4 is the amount of interbank loan compare to total credit or *linkage* variable which is seen in OLS-KBI1 model, in which the larger the *linkage* variable; therefore, the smaller the lending rate. In these models, the optimal weighted average cost of fund or *wacf* creates higher interest rate, and the higher the non-performing loan such as seen in *nplgrs* variable, the higher the lending rate.

The ratio of BRI lending rate compared to BRI deposit rate or *sbrikr/sbridp* creates positive impact on the BPR lending rate in all KBI models, which means that BRI becomes the market leader of BPR[23]. Every time BRI increases the lending rate, BPR will follow BRI in increasing the lending rate as well. This is in line with the mathematical model originated from the lender's risk hypothesis in which the formal sector rate becomes the benchmark of informal sector (BPR) rate.

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21 In Indonesia, this regulation is based on the BI director's decision number 26/20/KEP/DIR about the minimum requirements of bank capital and the circulating letter of Bank Indonesia number 26/2/BPPP for the case of BPR

22 Freixas, 2002, this is also in line with the Stiglitz and Greenwald book about the new monetary economic.

23 As those elaborated by Stephen Martin

In OLS-KBI and OLS-KBI1 models we find that the customer profile risk is expressed by the number of people under poverty line per total population or *miskin/pdk* as seen in the last components of optimal lending rate (shown in table IV.4) that creates increasing impact on the lending rate. It means that the economically weak group and the small and medium entrepreneur in poor area create higher BPR interest rate.

To see the impact of intervention to reduce lending rate, in table IV.4. In OLS-KBI1 model we are able to prove that the BI liquidity program *intervene*kredit* variable as the policy intervention[24] of the monetary authority is able to reduce lending rate based on the negative parameters of the model. The only different elements between OLS-KBI model and OLS-KBI1 model is the linkage elements as the BPR's networking effort to reach bigger economic of scale and economic of scope, and are able to reduce the lending rate of BPR to 26.96% that creates inelastic demand for credit -0.5894.

### III.3 The Elasticity:

The elements of total loanable fund are the time deposits, savings, inter bank liabilities, non-bank liabilities and BI liabilities. In table IV.5 we do not calculate the elasticity supply of BI liability, because the BI liquidity program is only temporary even though the BPR liabilities to BI are still shown until the Year 2002. The first two elements, the time deposit and saving, will create the calculation of the elasticity supply of time deposit, as well as the elasticity supply of saving.

### III.3.1 In Jabotabek

These elasticities of the alldeposit components are anticipated to be positive in sign, except maybe for saving. There is a tendency that the BPR savers in Jabotabek are coerced to save if they want to become the BPR debtors. In several big BPRs in Jabotabek, during surveys, it is also found that all debtors are also compelled to join the credit insurance. Therefore, in Jabotabek, there is no voluntary saving, which is anticipated to create confusing sign of the elasticity supply of saving[25]. The negative sign of this elasticity -2.339 reflects this. It means that even though BPR is reducing the saving rate, the BPR's savers are not lessening their saving in BPR. Moreover, for the sake of their anxious demand of credit, the saving rate consideration is not important.

24 The liquidity program was designed only during emergency situation. Even though it is stopped because the crisis is over, but the BPR liability to BI still exists during time observation (interview with BI staff).

25 In voluntary saving, the elasticity supply of deposit must be positive, because if the saving rate is higher than the amount of saving will be higher. But in BPR case, because the aim of the saver is not gaining the revenue from saving rate, but obtaining the credit, the normal elasticity supply of saving will not be performed.

From table IV.5 the elasticity nature of the supply of alldeposit elements in Jabotabek is 8.155 from total loanable fund, -2.339 from saving, 8.3249 from deposit, 0.1127 from bank loan, and 0.3897 from non-bank. These figures confirm the fact that BPR attracts mostly the bank and non-bank loan more than the depositors and the savers. It is shown from the more inelastic supply of bank and non-bank loan, compare to the elasticity supply of the savers and the depositors. This might be due to the fact that the image that BPR names (as Bank Perkreditan Rakyat) is reflecting more credit institution rather that saving institution. Hence to boost intermediary function, BPRs have to mobilize saving and deposit more.

**Table IV.5. Different Average Optimal Rates and Its Elasticity Demand and Supply In Jabotabek Using 2SLS-JBTB1 Model[26]**

| Components | | Interest rate Actual data | Interest rate predicted | Elasticity demand and supply | BRI-UD |
|---|---|---|---|---|---|
| Lending | | 38.81% | 41.89% | -1.7481* | 23.90% |
| Weighted | Saving | 13.45% | 3.79% | -2.339 | 11.35% |
| average cost of | Deposit | 18.99% | 15.05% | 8.3249 | 14.11% |
| fund (wacf) | Interbank loan | 24.43% | 15.67% | 0.1127 | n.a. |
| Non bank loan | | 15.03% | 2.14% | 0.3897 | n.a. |
| | Total | 13.83% | 13.16% | 8.155 | n.a. |

* hence Lerner monopoly index is equal to =0.57 if conjectural variation is =1

## III.3.2 in KBI

Due to aggregation, the BPR in KBI cannot be compared to the individual BPR in Jabotabek. In KBI, the different average rates cannot be interpreted as regional rate, because the data being used are aggregate data[27] . The configuration of these different aggregate elasticities in KBI can be seen in table IV.6 by using OLS-KBI model. The Lerner monopoly index in KBI is higher compare to those in Jabotabek (1.69 compare to 0.57) it is due to the fact that the inelastic demand for credit is found more in rural areas

26 The number appear in table 5 and 6 is the average number. Actually in actual computation, the individual rate of BPR exists. These tables are made to shorten the calculation.

27 For regional rate, the data have to be individually which expressed as the population of BPR in the area. Unfortunately these data are not available

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**Table IV.6. Different Average Optimal Rates and Its Elasticity Demand and Supply In KBI**

| | Interest rate Actual data | Interest rate predicted | Elasticity demand and supply | BRI-UD |
|---|---|---|---|---|
| Lending | 31.22% | 27.64% | -0.589* | 22.85% |
| Saving | 11.90% | 4.75% | 1.9198 | 11.30% |
| Deposit | 23.19% | 23.79% | 12.604 | 14.01% |
| Interbank loan | 17.52% | 14.07% | 0.0569 | n.a. |
| Non bank loan | 11.90% | 18.24% | -0.6060 | n.a. |
| Loanable funds (wacf) or alldeposit rate | 14.19% | 13.16% | 23.48 | n.a. |

* hence Lerner monopoly index is= 1.69

### III.4 Simulation to Reduce Risk:

The simulations, is seen in table IV.7 for Jabotabek and table IV.8 in KBI From the simulation, it is seen that the average risk premium of BPR can multiply the risk free credit in Jabotabek 1,127 up to 1,334 times; and in KBI 1,26 up to 1.373 times.

**Table IV.7. Customer Profile Risk and Total Risk In 2SLS-JBTB and 2SLS1-JBTB Exercise**

| | Total risk | Credit Risk | Liquidity Risk | Customer Profile Risk | Customer Profile safety**** | Optimal lending rate | Risk premium multiplier |
|---|---|---|---|---|---|---|---|
| Rule of thumb | 0.337* | 0.17 | 0.12 | 0.047 | n.a | 0.3881 | n.a |
| without monetary intervention | 0.1128** | 0.1119 | 0.0009 | 0.00 | -0.16009 | 0.4189 | 112.7% |
| with monetary intervention | 0.3678*** | 0.2488 | 0.0020 | 0.117 | -0.34731 | 0.3834 | 133.4% |

In Germany the risk premium multiply[28] 1.21 times the risk free credit.The most common influential risk of BPR customers in Jabotabek individual banks is coming in those factors related to the customer's well being such as shown in table IV.7. The better the well being of the customers, the smaller the risk of them.

28 Machauer and Weber. 1998. Bank behavior based on internal credit ratings of borrowers. Location: 5 major German Banks: Bayerische Vereinsbank, Deutche Bank, Dresder Bank and WestLB Focus: small medium-sized firms, 1992-1996. For the average rating category the multiplier is 32.3% from the good and excellent credit category. Multiplier 121% is found in credit that possesses the non-performing potentiality.

## XI. CONCLUSION

By finding a negatively sloped and inelastic demand curve both in individual and aggregate data, it is proofed that BPR enables to maximize profit as the price maker due to the assumption of monopolistic competition. Different BPR interest rates exist individually, due to the existence of different individual BPR liquidity, lending and customer profile risk and fund costs. Even though the aggregate data found the similar result, but it is premature to consider this as the regional rate, because in claiming the regional rate, the whole population of individual bank data in regions are needed, which is not fulfilled

The higher the BPR's risk free rate of credit compare to BRI's is due to three reasons. *First*, the smaller size of BPR with preserved variegated ownership makes BPR suffer from insufficient *economic of scale*[29]. *Second*, the inadequate *economic of scope*[30] of BPR is due to the restricted BPR activities[31]. *Third*, there is indication that BPR sees all its customers as the high-risk customers that enforce the implementation of high interest rate as proper compensation; and this is exaggerated as a result of imperfect information[32].

Interest rate is the weakest theory in the economy[33]; because the influencing variables have causal relationship[34] that makes empirical evidence becomes important. If one *cendol* seller in Central Java borrows Rp 50.000,- in BPR, she has to pay Rp 1000,- for the daily installment (the interest rate and its principal) for two months. It means that the magnitude of the interest rate is 120% per annum. At a glimpse, the debtors are seen as the casualty of the high interest rate, but if we see the negligible repayment all together with higher return on investment of selling *cendol*, hence the high BPR's interest rate seems appropriate. Actually

29 The diminishing long run average cost is due to bigger operational scale. Because BPR is the small bank, the transaction cost becomes bigger. This is elaborated in micro institutional theory that becomes the key of economic performance that make the neoclassical economy is not valid because this cost is assumed equal to zero.

30 More efficiency due to common production from different activities that create portfolio which reduce the risk.

31 BPR is not allowed to join the bank's clearing group

32 Not only the risk premiums are higher compared to the German banks, but it is also seen from the wide spread in BPR. In Jabotabek, the spread is 19.82% while in KBI it is 8.03%. The lower spread will push the intermediary function (supply& demand of borrowing & lending), which is pushed by the large amount of credit. Spread in the big city is higher due to the high-perceived risk due to the fact that the BPR customers usually consist of the intermittent market traders that at any time can go back to the rural areas.

33 The interest rate theory can be represented from 3 point of views (1) Compensation to the lender, (2) Compensation from the borrower, and (3) factors from outside the bank. In compensation to the lender, the bank will face credit, liquidity and inflation risk and the real price. Compensation from the borrower emerged because they gain higher productivity from the capital (Schumpeter, 1911); the theory about capital preference for current consumption (Boehm Warerk 1911); and liquidity preference (Keynes, 1930). This last approach can be divided into several micro approaches i.e. production, intermediation and modern approach that takes into account the risk. Factors from outside the bank are politic, policy, distance, social and psychological factors etc.

34 In Hoover, Kevin D, 2001: Causality in Macro Economics, Cambridge University Press, page 4 (Hume's table of theoretical Explanation for the Causal Links), and page 6, according to Hume, the interest rate formation is not a one way process but a forward and backward process that creates causal links. Interest rate will be influenced by investment; investment will be related to productivity from the firm's capital. In this case the firm will be related to the household through wages of the laborer. The wage, the sticky price and limited participation of household in this process, as well as the portfolio handling to overcome risk will influence the formation of interest rate. In econometric this causal relationship is tested by using Granger causality test.

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the main reason of the debtors when borrow from BPR is not the interest rate, but to gain easy access to the small and uncomplicated credit[35]. The formula of interest rate is too naive that hide the amount of credit, return on investment, risk premium, risk sharing, search cost and illiquidity factor. Unfortunately the discussions about interest rate often neglect these aspects, especially if the discussion is motivated more by the non-economic judgment.

Reducing interest rate of credit according to the new paradigm can be done only indirectly for example by obtaining cheaper cost of fund. This research found out that deposit and saving supply of BPR is more elastic compare to BPR's borrowing from the bank and non-bank. It means that the attraction of other bank and non-bank in channeling their funding through BPR is easier and more reliable compare to the saver and depositor funding. This finding also reflects that saving and deposit mobility in BPR is inadequate. Does it mean that Boeke's hypothesis during colonial period[36] about *credit thirst* is true? It is apparent that even though the role of deposit is not satisfying[37], but the growth and the amount of both saving and deposit and its accounts are faster and greater compare to those of credit[38]. Based on LPEM–FEUI's survey about micro finance[39] it is found out that respondents wants more saving and loan institution compare to credit institution with low lending rate. Hence the Boeke's hypothesis is wrong[40]. In the future BPR's name that possess profound connotation as credit rather than saving or deposit institution might be replaced with a proper name to reflect more effort to mobilize funding from savers and depositors which also reflects prudent and proper intermediary institution.

The low interest rate of bank and non bank borrowing of BPR[41] have potential to reduce

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35 Based on Unand and IBI survey in West Sumatra 2002, which was in cooperation with BI. It is found that interest rate is the 11th factors among 12 alternatives when the debtor's candidate borrows from BPR.

36 This hypothesis was made by Boeke during colonial period because the indigenous people who were thirsty of credit become the casualties of Tjina Mindring and Arab moneylender who imposed high interest rate. Because Tjina Mindrings were more numerous compare to the Arab moneylenders, it gave the Tjina Mindring more awful image. The convenience to collect the high interest credit repayment is worsened by the involvement of the village officials who worked in cooperation with the Chinese money lender (Tjina Mindring) as elaborated by Burger in Kahin's book about, Nationalism and Revolution in Indonesia, page 9. Based on ethical policy of the Dutch, government has to do something to protect the indigenous people. Between 1920 and 1928 Boeke and Fruin made district bank that became the grand fathered BPR, which were under the supervision of the ministry of Internal Affairs. Then the 'Volkscredietwezen' emerged at the year 1929 as the early form of BRI. This is elaborated by Schmit, L.Th. (1991), "Rural Credit Between Subsidy And Market, Adjustment Of The Village Units Of Bank Rakyat Indonesia" in Sociological Perspective, Leiden Development Studies, no.11, and page 55-61.

37 From the assessment it is found that the deposit role is 55,27% and from saving it is 25,15% from total loanable fund.

38 This is due to in Jabotabek, the deposit rate in BPR is 18.99% higher than BRI 14.11%, and the saving rate is 13.45% higher than BRI 11.35%. In KBI the BPR's deposit rate is 23.19% compare to 14.01% BRI UD's deposit rate, while the BPR's saving rate is 11.90% compare to 11.30% of the BRI-UD's.

39 Survey was done at 8 provinces in 1997 by LPEM-FEUI that performed this study about Financial Development in several backward areas in Indonesia.

40 Boeke's hypothesis is also opposed by Steinwand in his book, The Alchemy of Micro Finance, 2002.

41 It consists of 16,41% from inter bank borrowing and 2,10% from total lonable fund of BPR.

BPR interest rate of credit but actually these interest rates are high[42]. If BPR belongs to a group, the interest rate will be lower because the risks are smaller due to the risk spreading. Unfortunately the group ownership of BPR is prohibited[43], because there is apprehension that if BPR is getting bigger these banks are no longer willing to access the lower income and economically weak group[44]. If suspicious group ownership of BPR exists, the blame can be placed due to the adverse selection as a result of the weak regulation and supervision as the ex-post asymmetric information[45]. If BPR ownership in groups is not allowed, the program linkage such as *executing*[46] or *channeling*[47] is alternative solution to reduce BPR's interest rate. Empirically linkage variable able to reduce BPR's interest rate[48], but in Jabotabek the findings are not always consistent.

The six Cs debtor's prerequisite being used by BPR to reduce risk through relationship marketing[49] based on customer's profile that lengthens the customer's loyalty create higher cost per unit of lending. The overhead cost of BPR is about 20% from 100% lending rate.

Other effort to reduce lending rate of BPR can be developed if the information is disseminated well, so that the BPR debtors can see other sources of credit sources that make their credit demand becomes more elastic[50]. It will make BPR loosing its monopolistic power. Actually, all efforts to reduce lending rate are handed over to the market mechanism to decide the final rate. The new paradigm does not support the subsidized rate because credit quota will emerge in which mostly the rich individual attains the subsidized credit. No wonder that the income distribution is worsened. Moral hazard such as non-performing loan is often found due to the misperception that this credit is seen as the charity[51]. This is not only happened in Indonesia, but also in Bangladesh, India, Korea and Nepal[52]. The subsidized credit has created

42 Borrowing rate from other bank and non-bank consecutively 24.43% and 15.03% in Jabotabek; in KBI the rates are 11.9% and 17.52%. The cost of interest is higher in the big city (Jabotabek) compare to KBI because the higher risk is found in the big city.

43 Even though it is prohibited, but BI often receives several proposals to establish BPR in group. Despite this ban, actually BPR ownership in group is hard to supervise even though fit and proper tests are developed by BI.

44 Pandu Suharto (1991), in his book Peran, Masalah dan Prospek BPR, Lembaga Pengembangan Perbankan, Indonesia elaborated one of the BI director.

45 There is indication that BPR in group (even though it is prohibited), is still operating, but they are still imposing the high interest rate. This is due to the inelastic demand of credit. From econometric assessment there is no validity that the bigger BPR the smaller interest rate.

46 Executing is developed if the credit disbursement is in BPR and is seen in the balance sheet .

47 Channeling is formed if credit disbursement responsibility is located outside the BPR, this component is found in the off balance sheet.

48 The linkage variable here is proxied by BPR's inter bank lending rate repayment. Linkage can be seen in the financial or non-financial linkage such as in the supervision activities.

49 As shown by Leonard Berry

50 In Jabotabek (Jakarta, Bogor Tangerang Bekasi), when BNI creates Micro Service Unit in Jakarta with lower interest rate compare to BPR, creates lower rates of BPR due to more severe competition.

51 According to Remus Hasiholan (MPKP-FEUI thesis, under the supervision of the writer) in KUT assessment it is found that the more productive the KUT debtors the more the non-performed the credit repayment are found

52 Fry, Maxwell, loc cit.

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the weak financial institution and low economic growth. The wrong placement of resources due to layers of financial institution is the cause, in which the poor income people do not have access to credit, as well as the institutional sustainability is in danger.

To reduce BPR interest rate ban be done by reducing liquidity risk. BI encourages BPR to collect the pooling funds following the apex institution in Europe or in Ghana[53] to overcome their liquidity crisis, because BI is not the *lender of the last resort* for BPR[54] . This is considered as the special challenge due to the limited capacity and human resource quality in BPR[55]. BI seems to give attention more to the *conduct* of BPR rather that the BPR structure. Conduct is related to the supervision of the permitted activity[56] for example by using CAMEL formula to evaluate the performance of BPR. The structure is regulating the type of activity; for example BPR is confined to join the clearing group and its variegated ownership is preserved. The foreigner's ownership is not allowed either. In this case the Department of Finance concerns more on the structure rather than conduct. Dilemma for BI is that[57] the number of BPR under its supervision consists of 99% from the total number of bank, but the asset is only 0.4% from the total bank asset in which one BI staff has to supervise about 20 BPR units[58] . If the structure and conduct dualism of BPR is removed, the existence of BPR will be clarified and make the BPR and monetary supervision and management easier. If the development of special financial institution like BPR creates severe *deadweight loss* like in the Philippines, in the future, the related policy of BPR has to be evaluated[59] .

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53 In Ghana the pooling fund effort is made in cooperation of Ghana and the GTZ.

54 Ironically, the small bank bankruptcy is often seen as inevitable. On the other hand, bankruptcy for the big bank is seen as the contrary, due to the "too big too fail" theory in which BI as the lender of the last resort afraid that the systemic risk will occur if the big bank bankrupt. Freixas, Xavier and Rochet, Jean-Charles (2002), Micro Economics of Banking, The MIT Press, page 81. As a result, moral hazard at the big bank often found because BI always ready to help. The truth is that the real sector banking is often reflected by BPR rather than by the general bank. BPR can be compared with Berger, Klapper, and Udell research in 2001. "The ability of banks to lend to informationally opaque small business. Journal of banking & Finance". Their research found that in the US the small banks are always needed because the general bank and foreign bank have difficulties to widen their relationship with the small and informal firms. Unfortunately the BI view about BPR's bankruptcy is inevitable is often used by several parties to create moral hazard by using the blanket guarantee scheme to deceive BI such as seen from the account 502 in which the illegal claims were made by BPR Ciputat Sariartha, BPR Dayeuh Kolot, and BPR Badak Makmur at the amount of 0.27 trillion rupiahs, as those elaborated by the House of representative based on the BPK report which is agreed by BI (from Laksamana Net 2004).

55 Nowadays BPR through Perbarindo (BPR association) are working in cooperation with the GTZ.

56 BPR as well as general banks are monitored with CAMEL formula (Capital, Asset, Management, Earning and Liquidity) along with the minimum amount of capital and the reserve requirement.

57 Cole, David C and Slade, Betty F. 1996 "building a modern financial system the Indonesian Experience, Cambridge University Press 129-131.

58 This is due to the Supervisory Body of Financial Institution (LPJK) will be formed in 2010, according to Law number 3, 2004.

59 In Philippine, the deadweight loss is due to the serious fragmented and segmented credit market; the mild competition among financial institution, the high intermediary cost and inefficient allocation. Philippine owns different history compare to Indonesia. Unlike the Philippine's, BPR has a long history in Indonesia. This is why the policy for the Philippine and Indonesia are different. (Maxwell Fry)

This research is elaborating the BPR lending rate that is tinted with the paradigm contradiction of micro finance. In Indonesia, this disagreement is maintained on purpose[60]. This is often used as a compromise effort to reduce the intermittent political pressure that is different compared to economic consideration. Even though this research strengthened the conclusion that the micro assessment in banking can be very beneficial to support the monetary policy, but the shortcoming of research emerges due to the fact that the interest rate theory is the weakest theory among other in economy[61] , and this is exaggerated by the individual data constraint. The aggregate KBI data of BPR creates disinformation. Hopefully in the future, KBI is willing to collect data in detail at the individual banks' level to allow better assessment[62] . The case of individual BPR data in Jabotabek make generalization at national level is difficult. There is also seen the *trade off* between the level of significance and the magnitude of parameter. Further study by using TOBIT[63] approach that calculating the probability of risk with the existing current approach is very challenging. It is also interesting to assess the interdisciplinary approach for example economic, anthropology, sociology and religion about the BPR interest rate, as well as the comparison with Shariaat BPR assessment.

60 Marguerite Robinson mentioned that according to Javanese philosophy in shadow puppet opposites are part of the same whole.

61 In Hoover, Kevin D, 2001: Causality in Macro Economics, Cambridge University Press, page 4 (Hume's table of theoretical Explanation for the Causal Links) that reveal the causality in interest rate variables

62 For example by assessing the regional interest rate and testing the interest parity

63 TOBIT approach is censored regression model for the dependent variable. For example the probability of liquidity risk or credit risk has the lower value of zero and the highest value of one. TOBIT provides estimation tools according to the maximum likelihood to measure this probability.

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## APPENDIX 1

## BPR Model with credit and liquidity risk

Profit will be equal to total revenue minus total cost, or $\prod$ = TR-TC, in which total revenue will be equal to lending times interest rate or TR= L(r)*r and Total revenue is equal to lending times interest rate or TR= L(r)*r and total cost depends on the weighted average cost of fund times alldeposit or TC= *wacf*alldeposit*. In this calculation, risk will be explicitly put into the equation.

In this case $\Pr[\bar{y} \leq L]$ is the probability of **not default** or equal to (1-NPL), where debtors pay only the amount of $\bar{y}$ back from the total lending amount of L. From the amount of rupiah loans $\boldsymbol{L}$, in this case $\boldsymbol{r}_L$ is the interest rate charged by the BPR to its debtors. This rate is expected to be higher than the weighted cost of fund rate $\boldsymbol{r}_{WACF}$ that consist of saving, deposit, inter bank loan, non bank loan and BPR liability to BI and all of these possess their interest rate deposits $D(r_D)$ as well as from savings $S(r_S)$, but also from other sources of funds available to the BPR such as Inter Bank Liabilities, or IBL[64], whose rate is $\mathbf{r}_{IBL}$. We can write this as a mathematical function $IBL(\boldsymbol{r}_{IBL})$. BPR also receive other sources of funds from Non Bank Loans ( *NBL* ), which have their own interest rate $\boldsymbol{r}_{NBL}$. As a mathematical function, this is in the form of $NBL(\boldsymbol{r}_{NBL})$. The BPR only has to pay a proportional non monetary penalty in the amount of $\boldsymbol{r}_{PEN}$ to the Central Bank if there is a liquidity shortage, reflected in the low soundness of the BPR based on the CAMEL formula (*Capital, Assets, Management, Earnings, Liquidity*).

The probability of shortage occurs when liquidity is equal to zero, or when the liquid instruments have the value of $\bar{x}$ - *R*. Thus when the BPR tries to maximize profit, the liquidity risk $\Pr[\bar{y} \leq L]$ has to be taken into account in the form of $E[Max(0, L - \bar{\boldsymbol{y}})]$ well as the credit risk $\Pr[\bar{x} \geq R]$, which has to be calculated in the form of $E[Max(0, x - \bar{\boldsymbol{R}}_{BPR})]$ . The amount of the BPR's reserves $\boldsymbol{R}_{BPR}$ is equal to the amount of loanable funds $\boldsymbol{F}_{BPR}$ from many sources, subtracted by the BPR's actual lending $\boldsymbol{L}$ to the debtors, which is a function of lending rate $L(\boldsymbol{r}_L)$, or $\mathbf{R}_{BPR}=\mathbf{F}_{BPR}-\mathbf{L}(\mathbf{r}L)$

$$\prod = \{E[Max(0, L - \bar{\boldsymbol{y}})](1+\boldsymbol{r}_L)-(1+\boldsymbol{r}_{WACF})]L(\boldsymbol{r}_L)-0(\boldsymbol{R}_{BPR})-\boldsymbol{r}_{CAMEL}\,E[Max(0, \bar{x} - \boldsymbol{R}_{BPR})] \quad \text{(IV.1)}$$

Or, by combining equation (IV.1) with the explanation above we will have:

$$\prod = \{E[Max(0, L - \bar{\boldsymbol{y}})](1+\boldsymbol{r}_L)-(1+\boldsymbol{r}_{WACF})\}L(\boldsymbol{r}_L) \quad \text{(IV.2)}$$
$$-\boldsymbol{r}_{PEN}\,E[Max(\bar{0}, x - (S(\boldsymbol{r}_S) + D(\boldsymbol{r}_D) + IBL(\boldsymbol{r}_{IBL}) + NBL(\boldsymbol{r}_{NBL}) + CBL(\boldsymbol{r}_{BI}) - L(\boldsymbol{r}_L))]$$

In this case we will make the usual assumptions on $\boldsymbol{L}$ and $\boldsymbol{D}$ to ensure that $\prod$ is quasi-concave in $\mathbf{r}_L$ and $\mathbf{r}_D$: DD" - 2D'$^2$ > 0 and LL" - 2L'$^2$ > 0. Under these assumptions, the first order conditions

64 Inter Bank Assets or Aktiva Antar Bank

equal zero characterizes the maximum profit

$$\frac{\partial \prod}{\partial r_L} = \{ \Pr[\bar{y} < L](1+r_L)-(1+r_{WACF})\}L'(r_L)+\Pr[\bar{y} \le L]L(r_L)-r_{PEN}\Pr[\bar{x} \ge R]L'(r_L)=0 \qquad \text{(IV.3a)}$$

$$\frac{\partial \prod}{\partial r_D} = -(r_D)D'(r_D) - D(r_D) - r_{PEN}\Pr[\bar{x} \ge R]D'(r_L)=0 \qquad \text{(IV.3b)}$$

We will elaborate equation (IV.3a) in order to scrutiny the lending rate

$$\{\Pr[\bar{y} \le L] + \Pr[\bar{y} \le L]r_L - r_{WACF} - 1)\}L'(r_L) - r_{PEN}\Pr[\bar{x} \ge R]L'(r_L) + \Pr[\bar{y} \le L]L(r_L)=0$$

$$r_L = \frac{\{ r_{WACF} + 1 - \Pr[y < L] + r_{PEN}\Pr[x > R)\}L'(r_L) - \Pr[y < L]L(r_L)}{\Pr[y < L]L'(r_L)} \qquad \text{(IV.4)}$$

From outside the model, now the writer introducing the elasticity of the demand for loans and the supply of deposits,

$$\varepsilon_L = -\frac{r_L L'(r_L)}{L(r_L)} \qquad \varepsilon_D = -\frac{r_D D'(r_D)}{D(r_D)} \qquad \text{(IV.5a) and (IV.5b)}$$

Hence by combining equation (IV.4) and (IV.5a) we have the following equation:

$$-\varepsilon_L = \frac{r_L L'(r_L)}{L(r_L)} = \frac{\{ r_{WACF} + 1 - \Pr[\bar{y} \le L] + r_{PEN}\Pr[\bar{x} \ge R)\}L'(r_L) - \Pr[\bar{y} \le L]L(r_L)}{\Pr[\bar{y} \le L]L'(r_L)}\left(\frac{L'(r_L)}{L(r_L)}\right)$$

$$-\varepsilon_L = \frac{\{ r_{WACF} + 1 - \Pr[\bar{y} \le L] + r_{PEN}\Pr[\bar{x} \ge R)\}L'(r_L)}{\Pr[\bar{y} \le L]L(r_L)} - 1 \qquad \text{(IV.6)}$$

$$(r_L)\left(1-\frac{1}{\varepsilon_L}\right) = \frac{r_{WACF} + 1 + r_{PEN}\Pr[\bar{x} \ge R)}{\Pr[\bar{y} \le L]} - 1 \qquad \text{(IV.7)}$$

Hence the optimum value of $r_L$ is

$$r_L^* = \frac{r_{WACF} + 1 + r_{PEN}\Pr[\bar{x} \ge R)}{\Pr[\bar{y} \le L]\left(1-\frac{1}{\varepsilon_L}\right)} - \frac{1}{\left(1-\frac{1}{\varepsilon_L}\right)} \qquad \text{(IV.8)}$$

In order to find the optimum value of $r_D$ we will elaborate equation (IV.3b)

$$-r_D D'(r_D)-D(r_D)r_{PEN}\Pr[\bar{x} \ge R]D'(r_D) =0 \qquad \text{(IV.9)}$$

$$r_D = \frac{-r_{PEN}\Pr[\bar{x} \ge R]D'(r_D)-D(r_D)}{D'(r_D)} \qquad \text{(IV.10)}$$

We put the elasticity supply for deposit as seen in equation (IV.5b) into equation (IV.10)

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$$\varepsilon_D = \frac{\boldsymbol{r}_D D'(\boldsymbol{r}_D)}{D(\boldsymbol{r}_D)} = -\left(\frac{D'(\boldsymbol{r}_D)}{D(\boldsymbol{r}_D)}\right)\left(\frac{-\boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R]D'(\boldsymbol{r}_D) - D(\boldsymbol{r}_D)}{D'(\boldsymbol{r}_D)}\right) \quad \text{(IV.11)}$$

$$\varepsilon_D = \frac{-\boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R]D'(\boldsymbol{r}_D)}{D(\boldsymbol{r}_D)} + 1 \quad \text{(IV.12)}$$

$$\boldsymbol{r}_D(1-\varepsilon_D) = \frac{\boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R]D'(\boldsymbol{r}_D)}{D(\boldsymbol{r}_D)}(\boldsymbol{r}_D) \quad \text{(IV.13)}$$

$$\boldsymbol{r}_D(1-\varepsilon_D) = \boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R](-\varepsilon_D) \quad \text{(IV.14)}$$

$$\boldsymbol{r}_D\frac{(1-\varepsilon_D)}{(-\varepsilon_D)} = \boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R] \quad \text{(IV.15)}$$

$$\boldsymbol{r}_D\left(1-\frac{1}{\varepsilon_D}\right) = \boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R] \quad \text{(IV.16)}$$

Hence the optimum value of deposit rate is

$$\boldsymbol{r}_D^* = \frac{\boldsymbol{r}_{PEN}\Pr[\bar{x} \geq R]}{\left(1-\frac{1}{\varepsilon_D}\right)}$$

**APPENDIX 2**

**JABOTABEK**

**2SLS-JBTB**
ASSIGN @ALL F

WACF = 0.017485 + 0.017485 * LOG(ALLDEPOSIT) + 0.017485 * PRORISKLIQUI – 0.450501 * NGANGGUR – 0.024334 * [SBRIDP/SBTAB] – 1.4269e-07 * PEGAWAI

SBKRE = 0.32589 – 0.201178 * LOG[TKRED/TOTAS] + 0.325896 * NPL + 1.204366 * WACF – 0.03517 * [SBRIKR/SBTAB] – 3.119985 * [PDKOKAP/IKK]

System: AA2SLSOKBGS4=2SLS-JBTB
Estimation Method: Two-Stage Least Squares
Date: 10/16/04 Time: 15:09
Sample: 2 294
Included observations: 127
Total system (balanced) observations 254
Instruments: BOGOR BEKASI KRWANG CLGON TNGR MAKAN PKAPKO PESTA GRDEF C DEF MIKOT MIDES DAGANGD PEGAWAI TOTKERJA LIBURHAWAN PDDK

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C(2) | 0.017485 | 0.000965 | 18.12797 | 0.0000 |
| C(3) | -0.450501 | 0.071921 | -6.263852 | 0.0000 |
| C(5) | -0.024334 | 0.004889 | -4.977498 | 0.0000 |
| C(4) | -1.43E-07 | 4.92E-08 | -2.902286 | 0.0040 |
| C(10) | 0.325896 | 0.080782 | 4.034283 | 0.0001 |
| C(11) | -0.201178 | 0.080604 | -2.495893 | 0.0132 |
| C(12) | 1.204366 | 0.442680 | 2.720625 | 0.0070 |
| C(13) | -0.035170 | 0.015825 | -2.222458 | 0.0272 |
| C(14) | -3.119985 | 1.732255 | -1.801112 | 0.0729 |
| Determinant residual covariance | | 4.49E-05 | | |

Equation: ((WACF))=(C(2)+C(2)*LOG(ALLDEPOSIT)+C(2)*(PRORISKLIQUI)+C(3)*(LIBUR)+C(5)*SBRIDP/SBTAB+C(4)*PEGAWAI)
Observations: 127

| | | | |
|---|---|---|---|
| R-squared | 0.400364 | Mean dependent var | 0.141551 |
| Adjusted R-squared | 0.385739 | S.D. dependent var | 0.057139 |
| S.E. of regression | 0.044783 | Sum squared resid | 0.246676 |
| Durbin-Watson stat | 1.216792 | | |

Equation: ((SBKRE))=(C(10)+C(11)*LOG(TKRED/TOTAS)+C(10)*(NPL)+C(12)*(WACF)+C(13)*SBRIKR/SBTAB+C(14)*(PDKOKAP/IKK))
Observations: 127

| | | | |
|---|---|---|---|
| R-squared | 0.165436 | Mean dependent var | 0.403529 |
| Adjusted R-squared | 0.138073 | S.D. dependent var | 0.172126 |
| S.E. of regression | 0.159802 | Sum squared resid | 3.115461 |
| Durbin-Watson stat | 1.080243 | | |

**2SLS1-JBTB**
ASSIGN @ALL F

WACF = 0.017485 + 0.017485 * LOG(ALLDEPOSIT) + 0.017485 * PRORISKLIQUI – 0.450501 * NGANGGUR – 0.024334 * [SBRIDP/SBTAB] – 1.4269e-07 * PEGAWAI

SBKRE = 0.28084 – 0.151959 * LOG[TKRED/TOTAS] + 0.28084 * NPL + 1.02299 * WACF – 0.306866 * INTERVENE + 0.000305 * [MAKAN/PESTA]

System: AA2SLSOKBGS4ININ
Estimation Method: Two-Stage Least Squares
Date: 10/19/04 Time: 06:28
Sample: 2 294
Included observations: 132
Total system (unbalanced) observations 259
Instruments: BOGOR BEKASI KRWANG CLGON TNGR MAKAN PKAPKO PESTA GRDEF C DEF MIKOT MIDES DAGANGD PEGAWAI TOTKERJA NGANGGUR USAHAWAN PDDK

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C(2) | 0.017485 | 0.000965 | 18.12797 | 0.0000 |
| C(3) | -0.450501 | 0.071921 | -6.263852 | 0.0000 |
| C(5) | -0.024334 | 0.004889 | -4.977498 | 0.0000 |
| C(4) | -1.43E-07 | 4.92E-08 | -2.902286 | 0.0040 |
| C(10) | 0.280836 | 0.086387 | 3.250896 | 0.0013 |
| C(11) | -0.151959 | 0.056775 | -2.676500 | 0.0079 |
| C(12) | 1.022999 | 0.289374 | 3.535215 | 0.0005 |
| C(15) | -0.306866 | 0.135413 | -2.266153 | 0.0243 |
| C(16) | 0.000305 | 0.000128 | 2.386878 | 0.0177 |
| Determinant residual covariance | | 2.39E-05 | | |

Equation: ((WACF))=(C(2)+C(2)*LOG(ALLDEPOSIT)+C(2)*(PRORISKLIQUI)+C(3)*(NGANGGUR)+C(5)*SBRIDP/SBTAB+C(4)*PEGAWAI)
Observations: 127

| | | | |
|---|---|---|---|
| R-squared | 0.400364 | Mean dependent var | 0.141551 |
| Adjusted R-squared | 0.385739 | S.D. dependent var | 0.057139 |
| S.E. of regression | 0.044783 | Sum squared resid | 0.246676 |
| Durbin-Watson stat | 1.216792 | | |

Equation: ((SBKRE))=(C(10)+C(11)*LOG(TKRED/TOTAS)+C(10)*(NPL)+C(12)*(WACF)+C(15)*(INTERVENE)+C(16)*MAKAN/PESTA)
Observations: 132

| | | | |
|---|---|---|---|
| R-squared | 0.607162 | Mean dependent var | 0.398167 |
| Adjusted R-squared | 0.594789 | S.D. dependent var | 0.177634 |
| S.E. of regression | 0.113075 | Sum squared resid | 1.623823 |
| Durbin-Watson stat | 1.439375 | | |

**KBI**

OLS-KBI model

WACFF = 0.0002664 + 0.0057171 * LOG[ALLDEPOSIT1] + 0.005717 * RLIQUID + 0.0002664 * IKK + 3.629e-08 * USAHA2D – 0.019761 * [UPAHK/PDKOKAP]

SBKRE = 0.16853 + 0.16853 * WACFF + 0.24240 * NPLGRS –0.021657 *[KREDIT/TOASPR] + 0.022231 * [SBRIKR/SBPRDP] – 8.0314e-05 * [OTRCKR/OTRCTB] + 5.23928e-05 * [MISKIN/PDK]

System: AAOLSNWK1TANPA=OLS-KBI model
Estimation Method: Least Squares
Date: 10/18/04 Time: 17:16
Sample: 1 217
Included observations: 167
Total system (unbalanced) observations 261

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C(1) | 0.000266 | 8.63E-05 | 3.086137 | 0.0023 |
| C(2) | 0.005717 | 0.001039 | 5.503602 | 0.0000 |
| C(4) | 3.63E-08 | 2.12E-08 | 1.715881 | 0.0874 |
| C(5) | -0.019761 | 0.008444 | -2.340342 | 0.0201 |
| C(10) | 0.168527 | 0.034278 | 4.916457 | 0.0000 |
| C(11) | 0.242403 | 0.091387 | 2.652489 | 0.0085 |
| C(12) | -0.021657 | 0.011935 | -1.814605 | 0.0708 |
| C(13) | 0.022231 | 0.004939 | 4.501006 | 0.0000 |
| C(14) | -8.03E-05 | 4.72E-05 | -1.701810 | 0.0900 |
| C(15) | 5.24E-05 | 2.63E-05 | 1.992290 | 0.0474 |

| | |
|---|---|
| Determinant residual covariance | 5.69E-05 |

Equation: WACFF=(C(1)+C(2)*LOG(ALLDEPOSIT1)+C(2)*(RLIQUID)
+C(1)*IKK+C(4)*(USAHA2D)+C(5)*UPAHK/PDKOKAP)
Observations: 96

| | | | |
|---|---|---|---|
| R-squared | 0.145053 | Mean dependent var | 0.149207 |
| Adjusted R-squared | 0.117175 | S.D. dependent var | 0.071818 |
| S.E. of regression | 0.067479 | Sum squared resid | 0.418916 |
| Durbin-Watson stat | 2.707094 | | |

Equation: SBKRE=(C(10)+C(10)*WACFF+C(11)*NPLGRS+C(12)
*(KREDIT/TOASPR)+C(13)* SBRIKR/SBPRDP+C(14)*OTRCKR
/OTRCTB+C(15)*MISKIN/PDK)
Observations: 165

| | | | |
|---|---|---|---|
| R-squared | 0.134332 | Mean dependent var | 0.308648 |
| Adjusted R-squared | 0.107110 | S.D. dependent var | 0.127605 |
| S.E. of regression | 0.120577 | Sum squared resid | 2.311678 |
| Durbin-Watson stat | 2.241420 | | |

**OLS1-KBI model**

WACFF = [0.0002664 + 0.005717 * LOG[ALLDEPOSIT1] + 0.005717 * [RLIQUID] + 0.0002664 * IKK – 3.62996e-08 * [USAHA2D] - 0.01976 * [UPAHK/PDKOKAP]

SBKRE = 0.188134 + 0.188134 * WACFF + 0.14938 * NPLGRS + 0.02218 * [SBRIKR/SBPRDP] + 4.5157e-05 * [MISKIN/PDK] + 8.1873e-10 * KREDIT – 0.024335 * [KREDIT/TOASPR] – 1.6427e-09 * INTERVENE * KREDIT – 0.02803 * LINKAGE

System: AAOLSNWK1TANPA1
Estimation Method: Least Squares
Date: 10/18/04 Time: 22:59
Sample: 1 217
Included observations: 167

Total system (unbalanced) observations 261

| | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C(1) | 0.000266 | 8.63E-05 | 3.086137 | 0.0023 |
| C(2) | 0.005717 | 0.001039 | 5.503602 | 0.0000 |
| C(4) | -3.63E-08 | 2.12E-08 | -1.715881 | 0.0874 |
| C(5) | -0.019761 | 0.008444 | -2.340342 | 0.0201 |
| C(10) | 0.188134 | 0.033840 | 5.559577 | 0.0000 |
| C(11) | 0.149382 | 0.085743 | 1.742204 | 0.0827 |
| C(12) | 0.022176 | 0.004570 | 4.852265 | 0.0000 |
| C(13) | 4.52E-05 | 2.45E-05 | 1.846085 | 0.0661 |
| C(14) | 8.19E-10 | 1.63E-10 | 5.011665 | 0.0000 |
| C(15) | -0.024336 | 0.011072 | -2.198021 | 0.0289 |
| C(16) | -1.64E-09 | 3.55E-10 | -4.627090 | 0.0000 |
| C(17) | -0.028029 | 0.012671 | -2.212077 | 0.0279 |
| Determinant residual covariance | | 4.82E-05 | | |

Equation: WACFF=(C(1)+C(2)*LOG(ALLDEPOSIT1)+C(2)*(RLIQUID)
+C(1)*IKK-+C(4)*(USAHA2D)+C(5)*UPAHK/PDKOKAP)
Observations: 96

| | | | |
|---|---|---|---|
| R-squared | 0.145053 | Mean dependent var | 0.149207 |
| Adjusted R-squared | 0.117175 | S.D. dependent var | 0.071818 |
| S.E. of regression | 0.067479 | Sum squared resid | 0.418916 |
| Durbin-Watson stat | 2.707094 | | |

Equation: SBKRE=(C(10)+C(10)*WACFF+C(11)*NPLGRS+C(12)*
SBRIKR/SBPRDP+C(13)*MISKIN/PDK+C(14)*KREDIT+C(15)
*(KREDIT/TOASPR)+C(16)*INTERVENE*KREDIT+C(17)* LINKAGE)
Observations: 165

| | | | |
|---|---|---|---|
| R-squared | 0.270008 | Mean dependent var | 0.308648 |
| Adjusted R-squared | 0.237460 | S.D. dependent var | 0.127605 |
| S.E. of regression | 0.111429 | Sum squared resid | 1.949371 |
| Durbin-Watson stat | 2.431485 | | |